

Miniature Optical Isolator, Phase II

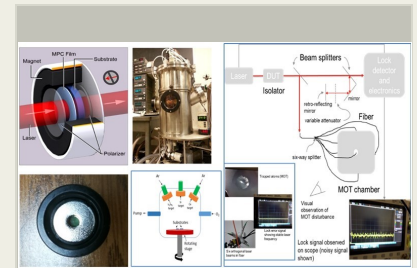
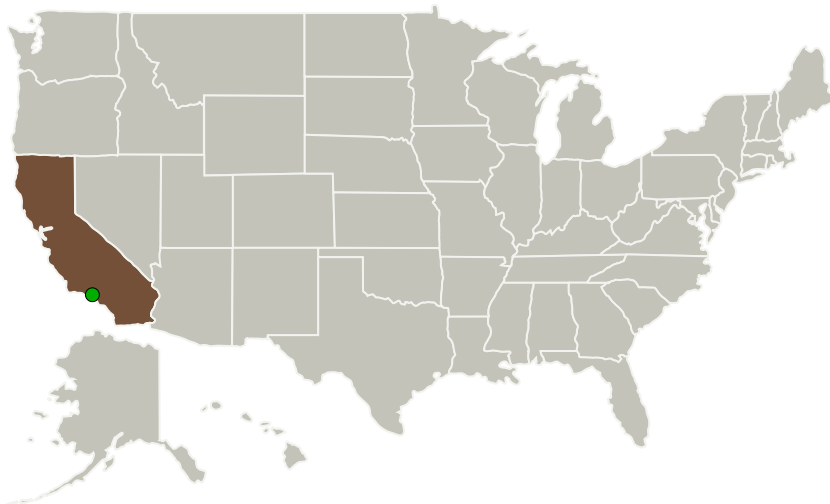
Completed Technology Project (2016 - 2018)



Project Introduction

To address NASA's need for compact optical isolators, Physical Optics Corporation (POC) proposes to continue the development of a new Miniature Optical Isolator (MOI). The novel optical isolator design is based on enhanced magneto-optical (MO) effects in magnetic photonic crystals. The innovation in the technology is its capacity to engineer MO effects not only by choosing the right material but also by adjusting the lattice parameters of 1 dimensional photonic crystals. While occupying a very small volume ($\sim 0.1 \text{ cm}^3$), a MOI device will achieve high optical transmission (2 dB or less forward loss) and excellent optical isolation (40 dB) at target wavelengths at a low cost. Therefore, the MOI technology directly addresses NASA's requirements for a compact, robust optical isolator for applications in cold atom systems. In Phase I, POC demonstrated the feasibility of the MOI technology through modeling and analysis, as well as fabrication of a proof-of-concept prototype with basic performance parameters characterized. In Phase II, POC will further optimize the device and fabricate prototypes for validation of key performance metrics, as well as evaluate life cycle and environmental performance.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Physical Optics Corporation	Lead Organization	Industry	Torrance, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

Project Transitions

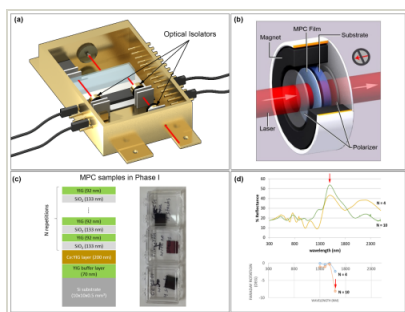
▶ **April 2016:** Project Start

✓ **July 2018:** Closed out

Closeout Documentation:

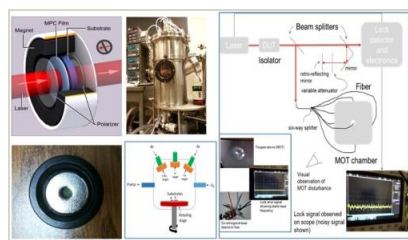
- Final Summary Chart(<https://techport.nasa.gov/file/139475>)

Images



Briefing Chart Image

Miniature Optical Isolator, Phase II
(<https://techport.nasa.gov/image/129525>)



Final Summary Chart Image

Miniature Optical Isolator, Phase II
(<https://techport.nasa.gov/image/135219>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Physical Optics Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David Miller

Co-Investigator:

Ziran Wu

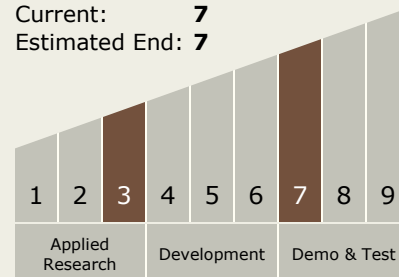
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Technology Maturity (TRL)

Start: **3**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.3 Optical Components

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System